

What is claimed is:

1. A material for a thermal fuse element wherein said material has an alloy composition in which In is 15% or larger and smaller than 37%, Sn is 5% or larger and 28% or smaller, and balance Bi, and in which, with respect to each of reference points of ternary Bi-In-Sn eutectic points of 57.5%Bi-25.2%In-17.3%Sn and 54.0%Bi-29.7%In-16.3%Sn, a range of $\pm 2\%$ Bi, $\pm 1\%$ In, and $\pm 1\%$ Sn is excluded.
2. A material for a thermal fuse element wherein 0.1 to 3.5 weight parts of one, or two or more elements selected from the group consisting of Ag, Au, Cu, Ni, Pd, Pt, Sb, Ga, and Ge are added to 100 weight parts of an alloy composition of claim 1.
3. An alloy type thermal fuse wherein a material for a thermal fuse element of claim 1 is used as a fuse element.
4. An alloy type thermal fuse wherein a material for a thermal fuse element of claim 2 is used as a fuse element.
5. An alloy type thermal fuse according to claim 3, wherein said fuse element contains inevitable impurities.
6. An alloy type thermal fuse according to claim 4, wherein said fuse element contains inevitable impurities.
7. An alloy type thermal fuse according to claim 3, wherein said fuse element is connected between lead conductors, and at least a portion of each of said lead conductors which is bonded to said fuse element is covered with a Sn or Ag

film.

8. An alloy type thermal fuse according to claim 4, wherein said fuse element is connected between lead conductors, and at least a portion of each of said lead conductors which is
5 bonded to said fuse element is covered with a Sn or Ag film.

9. An alloy type thermal fuse according to claim 5, wherein said fuse element is connected between lead conductors, and at least a portion of each of said lead conductors which is
10 bonded to said fuse element is covered with a Sn or Ag film.

10. An alloy type thermal fuse according to claim 6, wherein said fuse element is connected between lead conductors, and at least a portion of each of said lead conductors which is bonded to said fuse element is covered with a
15 Sn or Ag film.

11. An alloy type thermal fuse according to claim 3, wherein a pair of film electrodes are formed on a substrate by printing conductive paste containing metal particles and
20 a binder, said fuse element is connected between said film electrodes, and said metal particles are made of a material selected from the group consisting of Ag, Ag-Pd, Ag-Pt, Au, Ni, and Cu.

12. An alloy type thermal fuse according to claim 4,
25 wherein a pair of film electrodes are formed on a substrate

by printing conductive paste containing metal particles and a binder, said fuse element is connected between said film electrodes, and said metal particles are made of a material selected from the group consisting of Ag, Ag-Pd, Ag-Pt, Au, Ni, and Cu.

13. An alloy type thermal fuse according to claim 5, wherein a pair of film electrodes are formed on a substrate by printing conductive paste containing metal particles and a binder, said fuse element is connected between said film electrodes, and said metal particles are made of a material selected from the group consisting of Ag, Ag-Pd, Ag-Pt, Au, Ni, and Cu.

14. An alloy type thermal fuse according to claim 6, wherein a pair of film electrodes are formed on a substrate by printing conductive paste containing metal particles and a binder, said fuse element is connected between said film electrodes, and said metal particles are made of a material selected from the group consisting of Ag, Ag-Pd, Ag-Pt, Au, Ni, and Cu.

15. An alloy type thermal fuse according to claim 3, wherein a heating element for fusing off said fuse element is additionally disposed.

16. An alloy type thermal fuse according to claim 4, wherein a heating element for fusing off said fuse element is additionally disposed.

17. An alloy type thermal fuse according to claim 5, wherein a heating element for fusing off said fuse element is additionally disposed.

18. An alloy type thermal fuse according to claim 6,
5 wherein a heating element for fusing off said fuse element is additionally disposed.

19. An alloy type thermal fuse according to claim 7, wherein a heating element for fusing off said fuse element is additionally disposed.

10 20. An alloy type thermal fuse according to claim 8, wherein a heating element for fusing off said fuse element is additionally disposed.

21. An alloy type thermal fuse according to claim 9, wherein a heating element for fusing off said fuse element
15 is additionally disposed.

22. An alloy type thermal fuse according to claim 10, wherein a heating element for fusing off said fuse element is additionally disposed.

23. An alloy type thermal fuse according to claim 11,
20 wherein a heating element for fusing off said fuse element is additionally disposed.

24. An alloy type thermal fuse according to claim 12, wherein a heating element for fusing off said fuse element is additionally disposed.

25 25. An alloy type thermal fuse according to claim 13,

wherein a heating element for fusing off said fuse element is additionally disposed.

26. An alloy type thermal fuse according to claim 14, wherein a heating element for fusing off said fuse element
5 is additionally disposed.

27. An alloy type thermal fuse according to claim 3, wherein said fuse element connected between a pair of lead conductors is sandwiched between insulating films.

28. An alloy type thermal fuse according to claim 4,
10 wherein said fuse element connected between a pair of lead conductors is sandwiched between insulating films.

29. An alloy type thermal fuse according to claim 5, wherein said fuse element connected between a pair of lead conductors is sandwiched between insulating films.

15 30. An alloy type thermal fuse according to claim 6, wherein said fuse element connected between a pair of lead conductors is sandwiched between insulating films.

31. An alloy type thermal fuse according to claim 7, wherein said fuse element connected between a pair of lead
20 conductors is sandwiched between insulating films.

32. An alloy type thermal fuse according to claim 8, wherein said fuse element connected between a pair of lead conductors is sandwiched between insulating films.

33. An alloy type thermal fuse according to claim 9,
25 wherein said fuse element connected between a pair of lead

conductors is sandwiched between insulating films.

34. An alloy type thermal fuse according to claim 10, wherein said fuse element connected between a pair of lead conductors is sandwiched between insulating films.

5 35. An alloy type thermal fuse according to claim 11, wherein said fuse element connected between a pair of lead conductors is sandwiched between insulating films.

10 36. An alloy type thermal fuse according to claim 12, wherein said fuse element connected between a pair of lead conductors is sandwiched between insulating films.

37. An alloy type thermal fuse according to claim 13, wherein said fuse element connected between a pair of lead conductors is sandwiched between insulating films.

15 38. An alloy type thermal fuse according to claim 14, wherein said fuse element connected between a pair of lead conductors is sandwiched between insulating films.

20 39. An alloy type thermal fuse according to claim 3, wherein a pair of lead conductors are partly exposed from one face of an insulating plate to another face, said fuse element is connected to said lead conductor exposed portions, and said other face of said insulating plate is covered with an insulating material.

25 40. An alloy type thermal fuse according to claim 4, wherein a pair of lead conductors are partly exposed from one face of an insulating plate to another face, said fuse

element is connected to said lead conductor exposed portions, and said other face of said insulating plate is covered with an insulating material.

41. An alloy type thermal fuse according to claim 5, wherein a pair of lead conductors are partly exposed from one face of an insulating plate to another face, said fuse element is connected to said lead conductor exposed portions, and said other face of said insulating plate is covered with an insulating material.

42. An alloy type thermal fuse according to claim 6, wherein a pair of lead conductors are partly exposed from one face of an insulating plate to another face, said fuse element is connected to said lead conductor exposed portions, and said other face of said insulating plate is covered with an insulating material.

43. An alloy type thermal fuse according to claim 7, wherein a pair of lead conductors are partly exposed from one face of an insulating plate to another face, said fuse element is connected to said lead conductor exposed portions, and said other face of said insulating plate is covered with an insulating material.

44. An alloy type thermal fuse according to claim 8, wherein a pair of lead conductors are partly exposed from one face of an insulating plate to another face, said fuse element is connected to said lead conductor exposed por-

tions, and said other face of said insulating plate is covered with an insulating material.

45. An alloy type thermal fuse according to claim 9, wherein a pair of lead conductors are partly exposed from one face of an insulating plate to another face, said fuse element is connected to said lead conductor exposed portions, and said other face of said insulating plate is covered with an insulating material.

46. An alloy type thermal fuse according to claim 10, wherein a pair of lead conductors are partly exposed from one face of an insulating plate to another face, said fuse element is connected to said lead conductor exposed portions, and said other face of said insulating plate is covered with an insulating material.

47. An alloy type thermal fuse according to claim 11, wherein a pair of lead conductors are partly exposed from one face of an insulating plate to another face, said fuse element is connected to said lead conductor exposed portions, and said other face of said insulating plate is covered with an insulating material.

48. An alloy type thermal fuse according to claim 12, wherein a pair of lead conductors are partly exposed from one face of an insulating plate to another face, said fuse element is connected to said lead conductor exposed portions, and said other face of said insulating plate is covered with an insulating material.

ered with an insulating material.

49. An alloy type thermal fuse according to claim 13,
wherein a pair of lead conductors are partly exposed from
one face of an insulating plate to another face, said fuse
5 element is connected to said lead conductor exposed por-
tions, and said other face of said insulating plate is cov-
ered with an insulating material.

50. An alloy type thermal fuse according to claim 14,
wherein a pair of lead conductors are partly exposed from
10 one face of an insulating plate to another face, said fuse
element is connected to said lead conductor exposed por-
tions, and said other face of said insulating plate is cov-
ered with an insulating material.

51. An alloy type thermal fuse according to claim 3,
15 wherein lead conductors are bonded to ends of said fuse
element, respectively, a flux is applied to said fuse ele-
ment, said flux-applied fuse element is passed through a
cylindrical case, gaps between ends of said cylindrical
case and said lead conductors are sealingly closed, ends of
20 said lead conductors have a disk-like shape, and ends of
said fuse element are bonded to front faces of said disks.

52. An alloy type thermal fuse according to claim 4,
wherein lead conductors are bonded to ends of said fuse
element, respectively, a flux is applied to said fuse ele-
25 ment, said flux-applied fuse element is passed through a

cylindrical case, gaps between ends of said cylindrical case and said lead conductors are sealingly closed, ends of said lead conductors have a disk-like shape, and ends of said fuse element are bonded to front faces of said disks.

5 53. An alloy type thermal fuse according to claim 5, wherein lead conductors are bonded to ends of said fuse element, respectively, a flux is applied to said fuse element, said flux-applied fuse element is passed through a cylindrical case, gaps between ends of said cylindrical
10 case and said lead conductors are sealingly closed, ends of said lead conductors have a disk-like shape, and ends of said fuse element are bonded to front faces of said disks.

54. An alloy type thermal fuse according to claim 6, wherein lead conductors are bonded to ends of said fuse
15 element, respectively, a flux is applied to said fuse element, said flux-applied fuse element is passed through a cylindrical case, gaps between ends of said cylindrical case and said lead conductors are sealingly closed, ends of
said lead conductors have a disk-like shape, and ends of
20 said fuse element are bonded to front faces of said disks.

55. An alloy type thermal fuse according to claim 7, wherein lead conductors are bonded to ends of said fuse element, respectively, a flux is applied to said fuse element, said flux-applied fuse element is passed through a
25 cylindrical case, gaps between ends of said cylindrical

case and said lead conductors are sealingly closed, ends of said lead conductors have a disk-like shape, and ends of said fuse element are bonded to front faces of said disks.

56. An alloy type thermal fuse according to claim 8,
5 wherein lead conductors are bonded to ends of said fuse element, respectively, a flux is applied to said fuse element, said flux-applied fuse element is passed through a cylindrical case, gaps between ends of said cylindrical case and said lead conductors are sealingly closed, ends of
10 said lead conductors have a disk-like shape, and ends of said fuse element are bonded to front faces of said disks.

57. An alloy type thermal fuse according to claim 9,
wherein lead conductors are bonded to ends of said fuse element, respectively, a flux is applied to said fuse element,
15 said flux-applied fuse element is passed through a cylindrical case, gaps between ends of said cylindrical case and said lead conductors are sealingly closed, ends of said lead conductors have a disk-like shape, and ends of said fuse element are bonded to front faces of said disks.

20 58. An alloy type thermal fuse according to claim 10,
wherein lead conductors are bonded to ends of said fuse element, respectively, a flux is applied to said fuse element, said flux-applied fuse element is passed through a cylindrical case, gaps between ends of said cylindrical
25 case and said lead conductors are sealingly closed, ends of

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said lead conductors have a disk-like shape, and ends of said fuse element are bonded to front faces of said disks.